REMARKS

Applicant has reviewed and considered the Office Action mailed on April 13, 2009 (the "office action") and the references cited therein.

No claims are amended, canceled, or added; as a result, claims 1-17 are still pending in this application.

35 USC § 103 Rejection of the Claims

Claims 1-17 were rejected under 35 USC § 103(a) as being unpatentable over *Hyll* (U.S. Patent No. 6,005,893) in view of *Tsuzuki* (U.S. Publication No. 2001/0053973 A1).

To support an obviousness rejection, the Examiner must show that "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." 35 U.S.C. § 103(a) [emphasis added]. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

"Office personnel fulfill the critical role of fact finder when resolving the *Graham* inquiries. ... Factual findings made by Office personnel are the necessary underpinnings to establish obviousness." MPEP 2141(II) [emphasis added]. The key to supporting any rejection under 35 U.S.C. 103 is the clear articulation of the reason(s) why the claimed invention would have been obvious. The Supreme Court in *KSR* noted that the analysis supporting a rejection under 35 U.S.C. 103 should be made explicit. *KSR Int'l v. Teleflex Inc., 127 S. Ct. 1727, 82 USPQ2d 1385 (2007).* In KSR, the Court quoting *In re Kahn,* 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006), stated that "[R]ejections on obviousness cannot be sustained by mere

conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." In determining the differences between the prior art and the claims, the question under 35 U.S.C. 103 is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious. *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 218 USPQ 871 (Fed. Cir. 1983); *Schenck v. Nortron Corp.*, 713 F.2d 782, 218 USPQ 698 (Fed. Cir. 1983). MPEP 2141.02 (I) "All words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970).

The present rejection is traversed. In the office action, numerous factual errors are made with regard to the cited references. In addition, the Tsuzuki reference is in a non-analogous art field from the subject matter claimed in the present application. Furthermore, various limitations of the claims of the present application are neither disclosed or suggested by the cited references. Still further, the office action fails to provide "articulated reasoning with some rational underpinning to support the legal conclusion of obviousness" as required by KSR.

Claim 1 is an independent claim directed to a method for performing bit loading in a multicarrier communication system. More specifically, the method comprises: (a) obtaining transmission coefficients α_n for subchannels of a multicarrier channel, where n is a subchannel index; (b) calculating initial cost values for said subchannels using said transmission coefficients; (c) identifying a subchannel $\underline{n}$ having a lowest cost value; (d) allocating a new bit to said identified subchannel $\underline{n}$; and (e) updating said cost value of said identified subchannel $\underline{n}$, after allocating a new bit, using a cost function: $\Delta P_n = f(C_n) - g(\alpha_n)$, where C_n is a number of bits allocated to a subchannel n, $f(C_n)$ is a function of C_n that returns a baseline cost value for allocating an additional bit to subchannel n, and $g(\alpha_n)$ is a function of transmission coefficient α_n.

In the office action, the Examiner takes the position that Hyll discloses "obtaining transmission coefficients α_n for subchannels of a multicarrier channel, where n is a subchannel index" and "calculating initial cost values for said subchannels using said transmission coefficients" in the text of claim 1 of Hyll. More specifically, the office action states that the

element of claim 1 of Hyll "obtaining an error estimate on each subchannel" discloses "obtaining transmission coefficients ... " and the element of claim 1 of Hyll "allocating a number of bits to each subchannel ... by the error estimates" discloses "calculating initial cost values ...". The Applicants respectfully disagree. The "transmission coefficients" of claim 1 of the present application are the channel coefficients of the multicarrier channel. This is made clear in the specification of the present application. The channel (or transmission) coefficients of a channel are well known parameters in the communication arts. The "error estimate" described in claim 1 of Hyll is not a channel transmission coefficient, but is an estimate of an error associated with a subchannel. An example of an "error estimate" given in Hyll is noise standard deviation (see, e.g., column 5, lines 29-38). The USPTO is to give terms their broadest reasonable construction "in light of the specification as it would be interpreted by one of ordinary skill in the art." *In re Am. Acad. of Sci. Tech. Ctr.*, 367 F.3d 1359, 1364 (Fed. Cir. 2004). It is submitted that the broadest reasonable interpretation of the term "transmission coefficients" to a person of ordinary skill in the art would not encompass the "error estimate" described in Hyll. In addition, it is asserted that the broadest reasonable interpretation of the term "calculating initial cost values for said subchannels" in light of the specification would not include allocating a number of bits to subchannels.

The Examiner takes the position that the remainder of the elements of claim 1 of the present application are disclosed in Tsuzuki. That is, the Examiner states that Tsuzuki discloses "identifying a subchannel $\underline{n}$ having a lowest cost value;" "allocating a new bit to said identified subchannel $\underline{n}$;" and "updating said cost value of said identified subchannel $\underline{n}$, after allocating a new bit, using a cost function: $\Delta P_n = f(C_n) - g(\alpha_n)$, where C_n is a number of bits allocated to a subchannel n, $f(C_n)$ is a function of C_n that returns a baseline cost value for allocating an additional bit to subchannel n, and $g(\alpha_n)$ is a function of transmission coefficient α_n." The Applicants respectfully disagree. First of all, the "subchannels" referred to in these claim elements are defined earlier in the claim as "subchannels of a multicarrier channel." The "subbands" described in Tsuzuki are the result of the decomposition of an audio signal during MPEG audio encoding (see Tsuzuki paragraph [0005]). This is clearly not the same thing as subchannels of a multicarrier signal. In fact, nowhere in Tsuzuki are the concepts of multicarrier

signals or orthogonal frequency division multiplexing (OFDM) described or suggested. In addition, the mask-to-noise ratio (MNR) of Tsuzuki is not the same as the cost function $\Delta P_n = f(C_n) - g(\alpha_n)$ of claim 1 of the present application. For example, the MNR of Tsuzuki does not include a direct function of the number of bits that have already been allocated to a multicarrier subchannel n. In addition, the MNR of Tsuzuki does not include a direct function of the transmission coefficient of a multicarrier subchannel. In step S15 of Tsuzuki (see paragraph [0010]), the MNR of a subband to which bits were allocated is increased to "a predetermined level." Nowhere does Tsuzuki state that the MNR is updated based on a cost function that involves both a function of the number of bits that have already been allocated to a multicarrier subchannel and a function of the transmission coefficient of a multicarrier subchannel. As stated in the Graham case (see above), one of the factual inquiries that are applied for establishing a background for determining obviousness is "Determining the scope and contents of the prior art." As set out above, the Examiner has failed to accurately determine the scope and contents of the prior art as many of the limitations that the Examiner finds in the relied upon art are not there.

In addition to the above, it is further asserted that Tsuzuki is non-analogous art. Tsuzuki is primarily concerned with quantization bit allocation processing in MPEG audio encoding. Claim 1 of the present application, on the other hand, is concerned with bit loading in a multicarrier communication system. It is submitted that a person of ordinary skill in the art would know that these two areas present very different problems and challenges to a designer. As such, a person of ordinary skill faced with a multicarrier bit loading problem in a communication system would not look to solutions in the area of quantization bit allocation in audio encoding systems.

In the office action, the Examiner does not identify any differences between the cited art and the claimed subject matter. As stated in the Graham case (see above), one of the factual inquiries that are applied for establishing a background for determining obviousness is "Ascertaining the differences between the prior art and the claims at issue." As the Examiner has not identified any differences between the prior art combination and the claimed subject matter, the Examiner is asserting that all limitations of the independent claim 1 are taught by the

two relied upon references. As described above, this position is in error as there are many differences between the art and the claimed subject matter.

Finally, it is submitted that the office action fails to provide "articulated reasoning with some rational underpinning to support the legal conclusion of obviousness" as required by KSR. For example, as a rationale for the combination of references, the office action states that it would have been obvious to implement the limitations of Tsuzuki in the apparatus of Hyll because Tsuzuki "teaches the benefit of storing the values of the two functions in the lookup table so that to improve the performance, reduce cost and complexity in a bit allocation method." However, these limitations regarding lookup tables are not even recited within independent claim 1 of the present application. In addition, the lookup table of Tsuzuki is looking up a value for a number of bits to be allocated to a subband (see, e.g., paragraph [0028] of Tsuzuki) and not for a function that is used to calculate a cost value in a cost function. Furthermore, Tsuzuki indicates that the use of the lookup table "eliminates the necessity to perform a loop process as in FIG. 13" (see, e.g., paragraph [0028] of Tsuzuki). This teaches away from the subject matter of the present application which uses a repetitive loop process (see, e.g., Fig. 3 of the present application). In addition to the above, the subject matter relied upon within Tsuzuki (e.g., Fig. 13 and corresponding description in the background section) is identified as prior art material to the invention of Tsuzuki, but the rationale is describing limitations that are part of the invention of Tsuzuki. It is submitted that this description does not rise to the level of articulated reasoning contemplated by the Supreme Court in KSR.

Based on the foregoing, it is submitted that the Examiner has failed to provide a prima facie case of unpatentability with regard to independent claim 1 of the present application. It is further submitted that claim 1 of the present application is not rendered obvious by the combination of references cited by the Examiner. Reconsideration and allowance of independent claim 1 is therefore respectfully requested. Similar arguments apply to independent claim 11.

Claims 2-10 and claims 12-17 are dependent claims that depend either directly or indirectly from independent claims 1 and 11, respectively. Consequently, these claims are allowable for at least the same reasons as their corresponding base claims. These claims also provide further bases for patentability.

Conclusion

Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney (480-948-3745) to facilitate prosecution of this application.

Respectfully submitted,

ALEXANDER V. KOZLOV ET AL.

By their Representatives,

CUSTOMER NUMBER: 45643
480-948-3745

Date: August 13, 2009

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CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: Mail Stop Amendment, Commissioner of Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on this 13th day of August, 2009.

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